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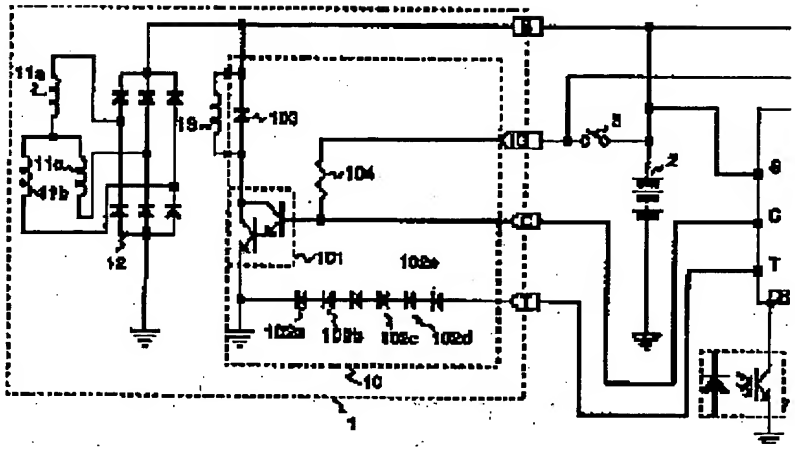
(54) CHARGING GENERATOR FOR VEHICLE

(57) Abstract:

PROBLEM TO BE SOLVED: To stabilize the rotational speed, primarily, the idling rotational speed of an engine, so as to improve the fuel consumption of the engine by deciding the generated voltage, based on the signal of the detected temperature of a generator.

SOLUTION: A generator 1 comprises a power substrate 10, armature windings 11a, 11b, and 11c of three-phase Y connection, a rectifier 12 for converting the AC output of the armature winding 11 into DC, and a field winding 13 for supplying armature windings 11a, 11b, and 11c with magnetic fluxes. Moreover, the interior of the power board is composed of a power transistor 10 Darlington-connected, diodes 102a, 102b, 102c, 102d, and 102e for detecting the temperature, a power diode 103, and a resistor 104. Then, the diodes 102a-102e are constituted of five diodes connected in series, and they

perform the control of an engine geared to the drive torque of a generator 1, by detecting the temperature of a generator 1 and performing the compensation of torque. As a result, the rotational speed, primarily the idling rotational speed of an engine is stabilized, and the fuel consumption of the engine can be improved.



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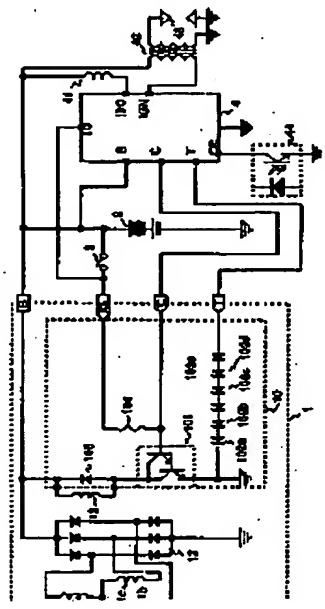
(54)【発明の名称】　車両用充電発電装置

(57)【要約】
【課題】発電機の温度を的確に検出し、発電機の駆動トルクに応じた機関の制御を行い、機関の回転速度、主としてアイドル回転速度の安定化を図り、機関の燃費を向上させる。
【解決手段】発電機の温度を検出する温度検出器を設け、前記温度検出器により検出された温度信号に基づき発電電圧を決定する。
【効果】機関の回転速度、主としてアイドル回転速度の安定化を図り、機関の燃費を向上させることが可能となった。

図１



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【特許請求の範囲】

【請求項１】バッテリと．該バッテリより給電され発電に供する界磁巻線と、該界磁巻線に直列に接続され界磁電流を通電又は遮断するスイッチング手段と、発電機の外に設置され前記バッテリの電圧を検出してその電圧に応じて前記スイッチング手段を通電または遮断する信号を生成し前記発電機の発電電圧を制御する制御装置からなる車両用充電発電装置において、

前記発電電圧制御装置は検出された発電機の温度信号に基づき発電電圧を決定することを特徴とする車両用充電発電装置。

【請求項２】請求項１記載において．前記発電機の温度信号は発電機に設けられる温度検出器から得られることを特徴とする車両用充電発電装置。

【請求項３】機関の回転に応じて駆動されバッテリを充電するための出力を発生する発電機と．前記バッテリより給電され発電に供する界磁巻線と．前記界磁巻線に直列に接続され界磁電流を通電又は遮断するスイッチング手段と、前記機関の燃料供給量を制御し、かつ前記バッテリの電圧を検出してその電圧に応じて前記スイッチング手段を通電または遮断する信号を生成し前記発電機の発電電圧を制御する制御装置とからなる車両用充電発電装置において．

前記発電機の温度を検出する温度検出器を設け．前記制御装置はスイッチング手段に与える通電信号の通電遮断比と前記温度検出器により検出された温度信号に基づき前記機関への燃料供給量を補正することを特徴とする温度検出器を内蔵したことを特徴とする車両用充電発電装置。

【請求項４】請求項２及び３記載のいずれかにおいて、前記温度検出器は、前記スイッチング手段の近傍に設置されることを特徴とする車両用充電発電装置。

【請求項５】請求項２，３または４記載のいずれかにおいて．前記温度検出器は．前記スイッチング手段の入力回路に直列に挿入され、前記制御装置から前記スイッチング手段へ出力する電圧をもって発電機の温度信号とすることを特徴とする車両用充電発電装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は自動車等に用いられる発電系統の改良に係り．特に機関の制御装置の中に発電制御機能を組み入れた装置の温度補償を確実に行える車両用充電発電装置に関する。

【０００２】

【従来の技術】発電機を発電機外に設置したマイクロコンピュータにより制御する方法については、特公平1－39306号公報等に述べられている。この方法では．バッテリの温度を検出し、その温度に応じた発電量を発電させていた。

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【発明が解決しようとする課題】しかし、この従来技術では発電機の機械的負荷（駆動トルク）をマイクロコンピュータが検知する場合の温度補償方法については論じられていなかった。発電機の機械的負荷（駆動トルク）は．発電機自体の温度により変化し．電気負荷スイッチの動作信号により負荷状態を検出することはできるが、発電機の駆動トルクを正確に把握することができず、ヘッドライトやエアコンなどの電気負荷の投入・遮断時の回転数が安定せず（特にアイドル回転時）、場合によってはエンストのような不都合があった。

【０００４】本発明では．発電機の温度を的確に検出し．発電機の駆動トルクに応じた機関の制御を行い、機関の回転速度．主としてアイドル回転速度の安定化を図り．機関の燃費を向上させることを目的とする。

【０００５】

【課題を解決するための手段】本発明はバッテリと、該バッテリより給電され発電に供する界磁巻線と．該界磁巻線に直列に接続され界磁電流を通電又は遮断するスイッチング手段と．発電機の外に設置され前記バッテリの電圧を検出してその電圧に応じて前記スイッチング手段を通電または遮断する信号を生成し前記発電機の発電電圧を制御する制御装置からなる車両用充電発電装置において．前記発電電圧制御装置は検出された発電機の温度信号に基づき発電電圧を決定することを特徴とする車両用充電発電装置によって達成される。

【０００６】本発明の好ましくは、前記発電機の温度信号は発電機に設けられる温度検出器から得られることを特徴とする車両用充電発電装置によって達成される。

【０００７】本発明は、機関の回転に応じて駆動されバッテリを充電するための出力を発生する発電機と．前記バッテリより給電され発電に供する界磁巻線と．前記界磁巻線に直列に接続され界磁電流を通電又は遮断するスイッチング手段と、前記機関の燃料供給量を制御し、かつ前記バッテリの電圧を検出してその電圧に応じて前記スイッチング手段を通電または遮断する信号を生成し前記発電機の発電電圧を制御する制御装置とからなる車両用充電発電装置において．前記発電機の温度を検出する温度検出器を設け、前記制御装置はスイッチング手段に与える通電信号の通電遮断比と前記温度検出器により検出された温度信号に基づき前記機関への燃料供給量を補正することを特徴とする温度検出器を内蔵したことを特徴とする車両用充電発電装置により達成する。

【０００８】本発明の好ましくは、前記温度検出器は、前記スイッチング手段の近傍に設置されることを特徴とする車両用充電発電装置によって達成される。

【０００９】本発明の好ましくは、前記温度検出器は、前記スイッチング手段の入力回路に直列に挿入され．前記制御装置から前記スイッチング手段へ出力する電圧をもって発電機の温度信号とすることを特徴とする車両用

【００１０】

【発明の実施の形態】本発明の一実施例を図１から図２で説明する。図１は本実施例による自動車用発電機及び周辺機器の回路図である。

【００１１】図１の１はエンジン（図示せず）により駆動される発電機であり、パワー基板１０，３相Ｙ結線になる電機子巻線１１ａ，１１ｂ，１１ｃ，電機子巻線１１の交流出力を直流に変換する整流装置１２，電機子巻線１１ａ，１１ｂ，１１ｃに磁束を供給する界磁巻線１３から成る。２はバッテリであり、３はキー・スイッチ．４はエンジンを制御するエンジン制御装置．４１はアイドル・スピードを制御するＩＳＣバルブ、４２は点火コイル、４３は点火プラグである。点火コイル、点火プラグについては１気筒分を記載したが、実際には４気筒、６気筒等気筒毎に点火系を備える。

【００１２】パワー基板１０の内部は．ダーリントン接続されたパワー・トランジスタ101．温度を検出するダイオード１０２ａ，１０２ｂ，１０２ｃ，１０２ｄ，１０２ｅ、パワー・ダイオード１０３，抵抗器１０４より構成される。

【００１３】さらに、図２にエンジン制御装置４の内部を示す。４０１、４０２は分圧抵抗器．４０３は５Ｖの定電圧を出力する定電圧回路、４０４は定電圧ライン(Vcc)、４０５は抵抗器．４０６はアナログ信号をデジタ＊ル値に変換するＡＤ変換器．４０７は演算処理を行うＭＰＵ．４０８は出力バッファ回路、４０９はトランジスタ．４１０，４１１はパワー・トランジスタである。エンジン制御装置４はエンジンへの燃料供給量を制御し、点火時期等を制御し総合的にエンジンを電子制御する動作を行うが、本実施例では発電制御周辺の回路のみを掲載している。

【００１４】以上の構成による、発電動作を次に説明する．図３は本実施例における、エンジン制御装置４の発電機に関わる部分のフローチャートを表す。一定の周期（例えば１０ｍsec.）で発電制御に関するタスクが実行される。ステップ３０１で電圧制御のタスクが開始されると．ステップ３０２へ移り、バッテリ電圧Ｖｓを取り込む。バッテリ２の電圧Ｖｓは、Ｓ端子を介して図２の分圧抵抗器４０１，４０２で分圧され．ＡＤ変換器４０６でデジタル値に変換される。この電圧値をＶｓとし、記憶する。次にステップ３０３で発電機の温度ＶＴを取り込む。発電機のＴ端子には図２の定電圧ラインＶｃｃから抵抗器４０５を介して電流が供給される。発電機１のダイオード１０２ａ～１０２ｅは5個のダイオードを直列接続して成り、Ｔ端子の電圧ＶＴは以下の式で表される。

【００１５】

$$VT = 5 \cdot VF(T) \quad (V) \qquad \cdots (1)$$

ここで、ＶＦはダイオードの順方向電圧を表し．その特性の一例としては以下のような温度特性を有す。

※【００１６】

$$VF = 0.65 - 0.002 \cdot (T - 25) \quad (V) \qquad \cdots (2)$$

ここで、Ｔ：ダイオードの温度（℃）である。（２）式★　★を（１）式に代入して

$$VT = 3.25 - 0.01 \cdot (T - 25) \quad (V) \qquad \cdots (3)$$

が得られる。得られたＶＴから温度Ｔは逆算して

$$T = 0.01 \cdot (3.25 - VT) + 25 \quad (℃) \qquad \cdots (4)$$

で求まる。

【００１７】次にステップ３０４で調整電圧設定値の計算を行う。一般に乗用車の車載バッテリを充電する電圧☆は．常温（２０℃）で１４．４Ｖ、発電機の温度により－０．０１Ｖ／℃の温度補償を行うのが最適であり、

$$Vset = 14.4 - 0.01 \cdot (T - 20) \quad (V) \qquad \cdots (5)$$

の計算を行う。

【００１８】次のステップ３０５では．出力すべき制御デューティの計算を行う。制御デューティは調整電圧設◆定値Ｖset と実際のバッテリ電圧取り込み値Ｖｓの偏差をなくすようにフィードバック制御を行う。本実施例では偏差に対してＰＩ（比例・積分）制御を行い．

$$D = K1 \cdot (Vset - Vs) + K2 \cdot \int (Vset - Vs)\,dt \qquad \cdots (6)$$

ここで、Ｋ１、Ｋ２はそれぞれ比例．積分定数である。

【００１９】実際のデジタル演算では図３の電圧制御タ＊スクが計算した前回のＤをＤｏとし．荷重平均により、

$$D = C1 \cdot (Vset - Vs) + C2 \cdot Do \qquad \cdots (7)$$

の式で計算すれば、（７）式は（６）式と等価になる。

【００２０】（７）式で計算されたデューティは．ステップ３０６でトランジスタ４０９に伝達される。そして．Ｃ端子を介してパワー・トランジスタ１０１のデューティを制御する。

【００２１】パワー・トランジスタ１０１のデューティより電機子巻線１１に発生する電圧が変わり、整流装置１２を介してバッテリ２の電圧が影響を受ける。バッテリ電圧Ｖｓは．以上に述べたソフトウエアにてフィードバック制御されており、調整電圧Ｖset に調整される。この調整電圧Ｖset は、発電機１内部の温度により補償され．低温時に高電圧，高温時に低電圧に設定され、バ

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$$VT = 6 \cdot VBE$$

となり、ダイオードを６個直列接続した図１の回路と同等になる。本実施例では少ない素子で第１の実施例と等価な回路を構成できるので．経済上の効果がある。

【００３２】本発明の第３の実施例を図６，図７に示す。図６の回路構成では．図１の回路図と比較してＣ端子とＴ端子を統合してＴ端子としている。図７は図６のエンジン制御装置４の内部回路を示す。図７では．Ｃ端子が省略され．トランジスタ４０９のコレクタはＴ端子に接続されている。本実施例によれば．パワートランジスタ１０１のベース電流は．ＩＧ端子から抵抗器１０４．ダイオード１０２ｅ．１０２ｄ．１０２ｃ．１０２ｂ．１０２ａを通って流れる。このベース電流によりＴ端子には(3)式の電圧が発生する。しかし、トランジスタ４０９が導通状態にあるときは、Ｔ端子電圧はトランジスタ４０９のコレクタ・エミッタ間飽和電圧（通常０．１Ｖ以下）に抑えられ．温度Ｔと無関係の電圧となる。従って、ＡＤ変換器にてＴ端子の電圧を取り込む時は．トランジスタ４０９が遮断状態にある必要がある。そこで、図３のステップ３０３において、トランジスタ４０９に導通信号を出力している時取り込まれたデータは．無効データとして無視すると良い。発電機の温度は急激に変化するものではなく、１０msec．の電圧制御タスク毎に取り込まれる必要はない。

【００３３】本実施例によれば、発電機１及びエンジン制御装置４の端子を１本ずつ減らすことが可能であり、経済性がさらに良くなる。

【００３４】本発明の第４の実施例を図８に示す。図８の１０は図６のパワー基板１０を置き換えた物である。

【００３５】パワー基板１０の内部は．ダーリントン接続されたパワー・トランジスタ101，温度を検出するト＊

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…(14′)

＊ランジスタ１０５，パワー・ダイオード１０３，抵抗器１０４．１０６ａ．１０６ｂより構成される。本実施例は第２の実施例と第３の実施例を組み合わせた物であり、ダイオードの個数を低減するとともに端子の数を低減しており、経済上の最大効果が得られる組み合わせになっている。

【００３６】

【発明の効果】本発明では．発電機の温度を的確に検出し．発電機の駆動トルクに応じた機関の制御を行い、機関の回転速度．主としてアイドル回転速度の安定化を図り．機関の燃費を向上させることが可能となる。

【図面の簡単な説明】

【図１】本発明の第１の実施例による自動車用発電機及び周辺機器の回路図。

【図２】図１のエンジン制御装置４の内部回路図。

【図３】第１の実施例における、エンジン制御装置４の発電機に関わる部分のフローチャート。

【図４】第１の実施例のアイドル回転数を補正するタスクのフローチャート。

【図５】本発明の第２の実施例によるパワー基板１０の内部回路図。

【図６】本発明の第３の実施例による自動車用発電機及び周辺機器の回路図。

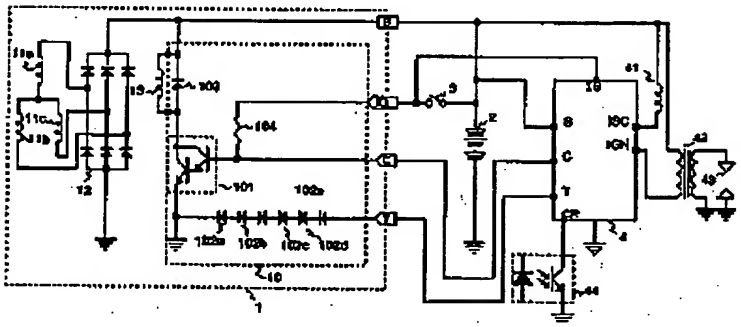
【図７】図６のエンジン制御装置４の内部回路図。

【図８】本発明の第４の実施例によるパワー基板１０の内部回路図。

【符号の説明】

４…エンジン制御装置、１０…パワー基板、４１…ＩＳＣバルブ、１０２ａ，１０２ｂ，１０２ｃ，１０２ｄ，１０２ｅ…ダイオード、４０６…ＡＤ変換器。

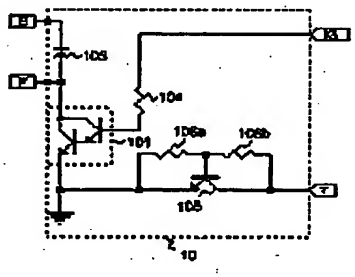
【図１】



図一

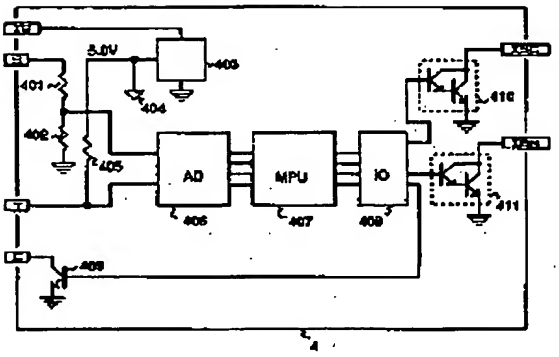
【図５】

図 5



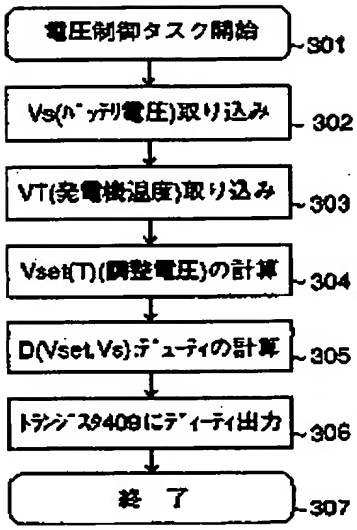
【図２】

図 2



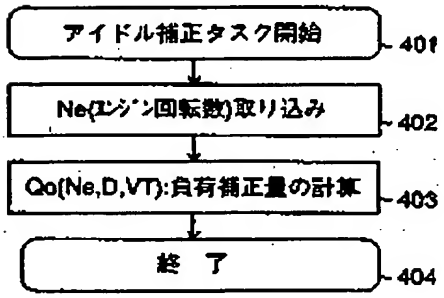
【図３】

図 3



【図４】

図 4



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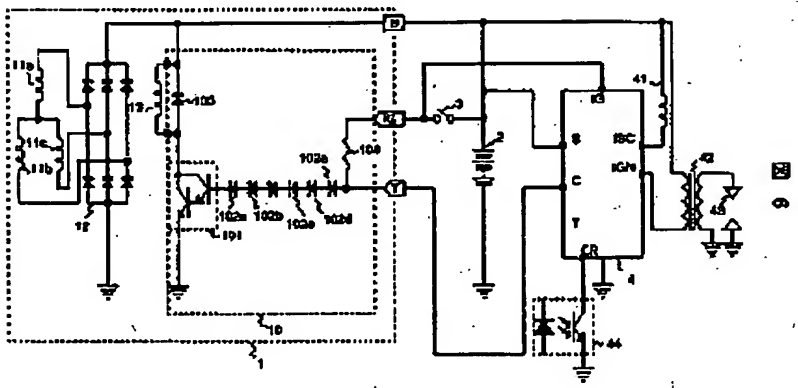
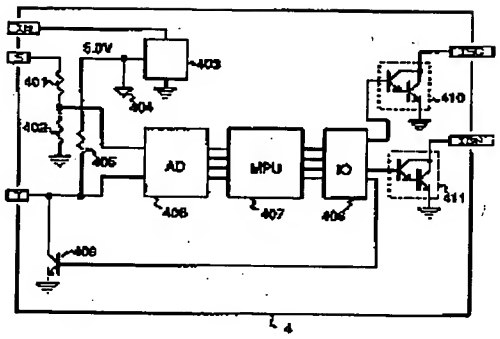


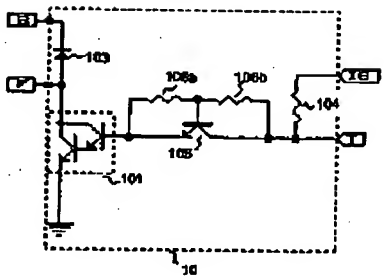
【図７】

図 7


5.0V
403
404
401
402
405
AD
MPU
IO
406
407
408
410
411
409
4

【図８】

図 8


103
106a
106b
104
105
101
10

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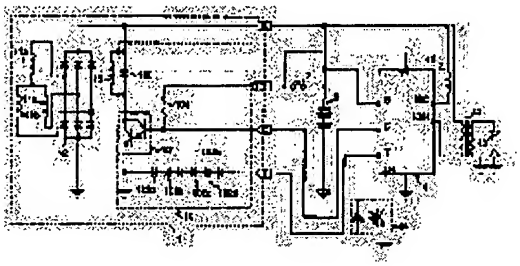
MASUNO KEIICHI

(54) CHARGING GENERATOR FOR VEHICLE

(57)Abstract:
PROBLEM TO BE SOLVED: To stabilize the rotational speed, primarily, the idling rotational speed of an engine, so as to improve the fuel consumption of the engine by deciding the generated voltage, based on the signal of the detected temperature of a generator.
SOLUTION: A generator 1 comprises a power substrate 10, armature windings 11a, 11b, and 11c of three-phase Y connection, a rectifier 12 for converting the AC output of the armature winding 11 into DC, and a field winding 13 for supplying armature windings 11a, 11b, and 11c with magnetic fluxes. Moreover, the interior of the power board is composed of a power transistor 10 Darlington-connected, diodes 102a, 102b, 102c, 102d, and 102e for detecting the temperature, a power diode 103, and a resistor 104. Then, the diodes 102a-102e are constituted of five diodes connected in series, and they perform the control of an engine geared to the drive torque of a generator 1, by detecting the temperature of a generator 1 and performing the compensation of torque. As a result, the rotational speed, primarily the idling rotational speed of an engine is stabilized, and the fuel consumption of the engine can be improved.



LEGAL STATUS

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[Date of sending the examiner's decision of rejection]	
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	withdrawal
[Date of final disposal for application]	24.04.2003
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[Date of registration]	
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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
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CLAIMS

[Claim(s)]
[Claim 1] A battery A field winding with which electric power is supplied from this battery and a generation of electrical energy is presented A switching means to be connected to this field winding at a serial, and to energize or intercept field current A control unit which generates a signal which is installed out of a generator, detects voltage of said battery, responds to the voltage, and energizes or intercepts said switching means, and controls generation-of-electrical-energy voltage of said generator It is the charge power plant for vehicles equipped with the above, and said generation-of-electrical-energy armature-voltage control equipment is characterized by determining generation-of-electrical-energy voltage based on a temperature signal of a detected generator.
[Claim 2] It is the charge power plant for vehicles characterized by being obtained from a thermometric element with which a temperature signal of said generator is formed in a generator in claim 1 publication.
[Claim 3] A generator which generates an output for driving according to rotation of an engine and charging a battery A field winding with which electric power is supplied from said battery and a generation of electrical energy is presented A switching means to be connected to said field winding at a serial, and to energize or intercept field current A control unit which controls said engine's amount of fuel supply, and generates a signal which detects voltage of said battery, responds to the voltage, and energizes or intercepts said switching means, and controls generation-of-electrical-energy voltage of said generator It is the charge power plant for vehicles characterized by building in a thermometric element equipped with the above, and a thermometric element which detects temperature of said generator is formed, and it is characterized by said control unit amending the amount of fuel supply to said engine based on a temperature signal detected by an energization cutoff ratio and said thermometric element of an energization signal given to a switching means.
[Claim 4] It is the charge power plant for vehicles characterized by installing said thermometric element near said switching means in either claim 2 and 3 publications.
[Claim 5] It is the charge power plant for vehicles characterized by considering as a temperature signal of a generator with voltage which said thermometric element is inserted in a serial in either according to claim 2, 3, or 4 in an input circuit of said switching means, and is outputted to said switching means from said control unit.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to the charge power plant for vehicles which can perform certainly temperature compensation of the equipment which was applied to amelioration of the generation-of-electrical-energy network used for an automobile etc., especially incorporated the generation-of-electrical-energy control function into an engine's control unit.
[0002]
[Description of the Prior Art] How to control by the microcomputer which installed the generator out of the generator is stated to JP,1-39306,B etc. The temperature of a battery was detected and the amount of generations of electrical energy according to that temperature was made to generate by this method.
[0003]
[Problem(s) to be Solved by the Invention] However, with this conventional technology, the temperature-compensation method in case a microcomputer detects the mechanical load (driving torque) of a generator was not discussed. Have not grasped driving torque of a generator correctly, and its rotational frequency at the time of an injection and cutoff of electric loads, such as a headlight and an air-conditioner, having not been stable (at the time [Especially] of idle rotation), and having un-arranged like an engine failure depending on the case, although the mechanical load (driving torque) of a generator could change with the temperature of the generator itself and could detect loaded condition with the actuating signal of an electric load switch.
[0004] The temperature of a generator is detected exactly and the engine according to the driving torque of a generator is controlled by this invention, and stabilization of idle rotational speed is mainly attained and it aims at an engine's rotational speed and raising an engine's fuel consumption.
[0005]
[Means for Solving the Problem] A field winding with which electric power is supplied to this invention from a battery and this battery, and a generation of electrical energy is presented, A switching means to be connected to this field winding at a serial, and to energize or intercept field current, In a charge power plant for vehicles which consists of a control unit which generates a signal which is installed out of a generator, detects voltage of said battery, responds to the voltage, and energizes or intercepts said switching means, and controls generation-of-electrical-energy voltage of said generator Said generation-of-electrical-energy armature-voltage control equipment is attained by charge power plant for vehicles characterized by determining generation-of-electrical-energy voltage based on a temperature signal of a detected generator.
[0006] A temperature signal of said generator is preferably attained by charge power plant for vehicles characterized by being obtained from a thermometric element of this invention formed in a generator.
[0007] A generator which generates an output for driving this invention according to rotation of an engine, and charging a battery, A field winding with which electric power is supplied from said battery and a generation of electrical energy is presented, and a switching means to be connected to said field winding at a serial, and to energize or intercept field current, In a charge power plant for vehicles which consists of a control unit which controls said engine's amount of fuel supply, and generates a signal which detects voltage of said battery, responds to the voltage, and energizes or intercepts said switching means, and controls generation-of-electrical-energy voltage of said generator A thermometric element which detects temperature of said generator is formed. A charge power plant for vehicles characterized by building in a thermometric element characterized by amending the amount of fuel supply to said engine based on a temperature signal detected by an energization cutoff ratio and said thermometric element of an energization signal given to a switching means attains said control unit.

[0008] Said thermometric element is preferably attained by charge power plant for vehicles characterized by thing of this invention installed near said switching means.
[0009] Preferably, said thermometric element is inserted in a serial in an input circuit of said switching means, and is attained by charge power plant for vehicles characterized by considering as a temperature signal of a generator with voltage of this invention outputted to said switching means from said control unit.
[0010]
[Embodiment of the Invention] Drawing 2 explains one example of this invention from drawing 1 . Drawing 1 is the circuit diagram of the generator for automobiles by this example, and a peripheral device.
[0011] 1 of drawing 1 is a generator driven with an engine (not shown), and consists of the power substrate 10, the armature windings 11a, 11b, and 11c which turn into three-phase-circuit Y connection, the rectifier 12 which changes the ac output of an armature winding 11 into a direct current, and the field winding 13 which supplies magnetic flux to armature windings 11a, 11b, and 11c. 2 is a battery and, as for the engine control system by which 3 controls a key switch and 4 controls an engine, the ISC bulb by which 41 controls idle speed, and 42, an ignition coil and 43 are ignition plugs. Although a part for a 1 cylinder was indicated about the ignition coil and the ignition plug, it has an ignition system for every gas columns, such as a 4-cylinder and 6-cylinder, in fact.
[0012] The interior of the power substrate 10 consists of the power transistor 101 by which Darlington connection was carried out, diodes 102a, 102b, 102c, 102d, and 102e which detect temperature, a power diode 103, and a resistor 104.
[0013] Furthermore, the interior of an engine control system 4 is shown in drawing 2 . As for an output-buffer circuit and 409, the voltage stabilizer where 401,402 outputs a partial pressure resistor and 403 outputs the constant voltage of 5V, the A-D converter from which constant-voltage Rhine (Vcc) and 405 change an analog signal into a resistor, and 404 changes 406 into digital value, MPU to which 407 performs data processing, and 408 are [a transistor and 410,411] power transistors. Although actuation which an engine control system 4 controls the amount of fuel supply to an engine, controls ignition timing etc., and carries out electronics control of the engine synthetically is performed, in this example, only the circuit of the generation-of-electrical-energy control circumference is carried.
[0014] The generation-of-electrical-energy actuation by the above configuration is explained below. Drawing 3 expresses the flow chart of the portion in connection with the generator of an engine control system 4 in this example. The task about generation-of-electrical-energy control is performed with a fixed period (for example, 10msec(s).). If the task of armature-voltage control is started at step 301, it will move to step 302 and battery voltage Vs will be incorporated. The partial pressure of the voltage Vs of a battery 2 is carried out by the partial pressure resistor 401,402 of drawing 2 through a switch terminal, and it is changed into digital value by A-D converter 406. This voltage value is set to Vs and memorized. Next, the temperature VT of a generator is incorporated at step 303. Current is supplied to T terminal of a generator through a resistor 405 from constant-voltage Rhine Vcc of drawing 2 . The diodes 102a-102e of a generator 1 carry out series connection of the five diodes, and change, and the voltage VT of T terminal is expressed with the following formulas.
[0015]
VT=5, VF (T) (V) -- (1)
Here, VF expresses the forward voltage of diode and has the following temperature characteristics as an example of the property.
[0016]
VF=0.65-0.002- (T-25) (V) -- (2)
Here, it is the temperature (degree C) of T:diode. (2) Substitute a formula for (1) type. VT=3.25-0.01- (T-25) (V) -- (3)
**********. Temperature T is counted backward from obtained VT. T= 0.01-(3.25-VT) +25 (degree C) -- (4)
It can be come out and found.
[0017] Next, the control voltage set point is calculated at step 304. The voltage which generally charges the mounted battery of a passenger car is -0.01v/degree C by the temperature of 14.4V and a generator at ordinary temperature (20 degrees C). It is optimal to perform temperature compensation. Vset=14.4-0.01- (T-20) (V) -- (5)
****** is performed.
[0018] Control duty which should be outputted is calculated at the following step 305. Control duty is the control voltage set point Vset. Feedback control is performed so that the deflection of the actual battery voltage incorporation value Vs may be lost. In this example, PI (proportionality and integral) control is performed to deflection. D=K1, +K2, and integral(Vset-Vs) dt -- (6)
Here, K1 and K2 are proportionality and an integration constant, respectively.
[0019] The last D which the armature-voltage control task of drawing 3 calculated by the actual digital operation is set to Do, and it is a weighted mean. D=C1 and (Vset-Vs) +C2, Do -- (7)

If it calculates by the ** type, (7) types will become (6) types and equivalence.
[0020] (7) The duty calculated by the formula is transmitted to a transistor 409 at step 306. And the duty of a power transistor 101 is controlled through C terminal.
[0021] The field current which flows to a field winding 13 by the duty of a power transistor 101 changes, the voltage which this generates in an armature winding 11 changes, and the voltage of a battery 2 is influenced through a rectifier 12. Feedback control is carried out by the software stated above, and battery voltage Vs is control voltage Vset. It is adjusted. This control voltage Vset It is compensated with the temperature of the generator 1 interior, and it is set as the high voltage at the time of low temperature, and is set as a low battery at the time of an elevated temperature, and a battery 2 is charged.
[0022] Next, the task which amends idle rpm by drawing 4 is explained. If an idle amendment task is performed at a fixed gap by step 401, an engine speed Ne will be incorporated at step 402. Ne is calculated from the period of the pulse signal which the crank angle sensor 44 generates. At step 403, count which amends an air flow rate from electric load is carried out.
[0023] Torque Td which drives a generator Td=A-Po-eta (Ng) (kgf-m) -- (8)
It is come out and expressed. It is here and is A. : Constant Po : Output power of a generator (W)
eta (Ng): Effectiveness of a generator (it is dependent on rotational speed)
Ng: -- rotational speed of a generator (r/m) it is . Output power of a generator (W) Po=Vs-Io (W) -- (9)
Io: The output current of a generator (A) It is expressed.
[0024] Furthermore, to field current IF, the output current of a generator becomes settled uniquely by the magnetic circuit of a generator, and is expressed with the function which carries out the increment in monotone.
[0025]
Io=F (IF, Ng) (A) -- (10) Here and field current IF are expressed with the following formula to the duty D inputted from C terminal.
[0026]
IF=D- (Vs-Vcesat.)/Rr (T) -- (11) However, Vcesat.: Voltage between collector emitters of a power transistor 101 (V)
Rr (T): It is the resistance (omega) of a field winding 13. Rr (T) =Rro+(T-20) -gamma (omega) -- (12) Resistance of the field winding 13 at the time of Rro:20 degree C (omega)
gamma : temperature coefficient of the resistance of a field winding 13 (ohm/degree C)
(9) If (12) types are substituted for (8) types from a formula Td=A-Vs -F(D-Vs-Vcesat.)/(Rro+(T-20) -gamma), Ngandeta (Ng) -- (8') It is obtained. (8') In a formula, it can ask from the rotational speed Ng of the generator calculated by the engine speed Ne incorporated at Vs incorporated at the duty D calculated at the drawing 3 step 305, and this step 302, the temperature T incorporated at this step 303, and step 402 of drawing 4 by multiplying by the speed ratio (usually effective diameter ratio of a pulley) of an engine and a generator.
[0027] In addition, A, Vcesat., and Rro and gamma are beforehand memorized as a constant. Moreover, Functions F (IF, Ng) and eta (Ng) are dispersed as data of a generator proper.
[0028] The air content Qo demanded from the torque value consumed with a generator is computable from an engine property. If the air content proportional to consumption torque generally is amended and it is made to increase, it will become possible to obtain the fixed engine speed.
[0029] In this example, by detecting the temperature of a generator and amending torque, it becomes possible to perform precise amendment and it can stabilize idle rotation of an engine. Thereby, the set point of an engine idle rotational speed can be made lower than before, and it contributes to lessening the improvement in fuel consumption, and the total amount of an exhaust gas injurious ingredient. The 2nd example of this invention is shown in drawing 5 . 10 of drawing 5 is the object which replaced the power substrate 10 of drawing 1 .
[0030] The interior of the power substrate 10 consists of the power transistor 101 by which Darlington connection was carried out, a transistor 105 which detects temperature, a power diode 103, and resistors 104,106a and 106b.
[0031] Here, the circuit which consists of a transistor 105 and resistors 106a and 106b performs actuation equivalent to the diodes 102a, 102b, 102c, 102d, and 102e of drawing 1 . If base current is made into zero noting that the current amplification factor of a transistor 105 is large enough, the voltage which pressured the voltage VT of T terminal partially by resistor R106a and R106b will become equal to the voltage between base emitters of a transistor 105. VT-R106a/(R106a+R106b) =VBE -- (13) It becomes. That is, when VT is counted backward from (13) types, it is. VT= (R106a+R106b)/R106 a-VBE -- (14) It is possible by becoming and choosing the value of resistor R106a and R106b suitably to make it a larger value than VBE. VBE is equivalent to VF (forward voltage of diode) of (1) type, and dependent on temperature. R106a=1kohm, and k ohm, then R106b=5 (14) type VT=6, VBE -- (14')
It becomes equivalent to the circuit of drawing 1 which carried out six-piece series connection of a next door and the

diode. Since a circuit equivalent to the 1st example can be constituted from few elements in this example, there is an effect on economy.

[0032] The 3rd example of this invention is shown in drawing 6 and drawing 7 . In the circuitry of drawing 6 , C terminal and T terminal are unified as compared with the circuit diagram of drawing 1 , and it is considering as T terminal. Drawing 7 shows the internal circuitry of the engine control system 4 of drawing 6 . In drawing 7 , C terminal is omitted and the collector of a transistor 409 is connected to T terminal. According to this example, the base current of a power transistor 101 flows through a resistor 104 and Diodes 102e, 102d, 102c, 102b, and 102a from an ignition switch terminal. For T terminal, the voltage of (3) types occurs according to this base current. However, when a transistor 409 is in switch-on, T terminal voltage is stopped by the saturation voltage between collector emitters of a transistor 409 (it is usually 0.1V following), and turns into voltage unrelated to temperature T. Therefore, when incorporating the voltage of T terminal in an A-D converter, a transistor 409 needs to be in a cut off state. Then, in step 303 of drawing 3 , the data incorporated while outputting the continuity signal to the transistor 409 is good to ignore as an invalid data. The temperature of a generator does not change rapidly and does not need to be incorporated for every armature-voltage control task of 10msec.

[0033] According to this example, it is possible to reduce one [at a time] the terminal of a generator 1 and an engine control system 4, and economical efficiency becomes still better.

[0034] The 4th example of this invention is shown in drawing 8 . 10 of drawing 8 is the object which replaced the power substrate 10 of drawing 6 .

[0035] The interior of the power substrate 10 consists of the power transistor 101 by which Darlington connection was carried out, a transistor 105 which detects temperature, a power diode 103, and resistors 104,106a and 106b. This example is the object which combined the 2nd example and 3rd example, it is reducing the number of terminals while it reduces the number of diode, and it has become the combination from which the optimum on economy is acquired.

[0036]

[Effect of the Invention] The temperature of a generator is detected exactly and the engine according to the driving torque of a generator is controlled by this invention, and stabilization of idle rotational speed is mainly attained and it becomes possible an engine's rotational speed and to raise an engine's fuel consumption.

[Translation done.]

* NOTICES *

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DRAWINGS

[Drawing 1]

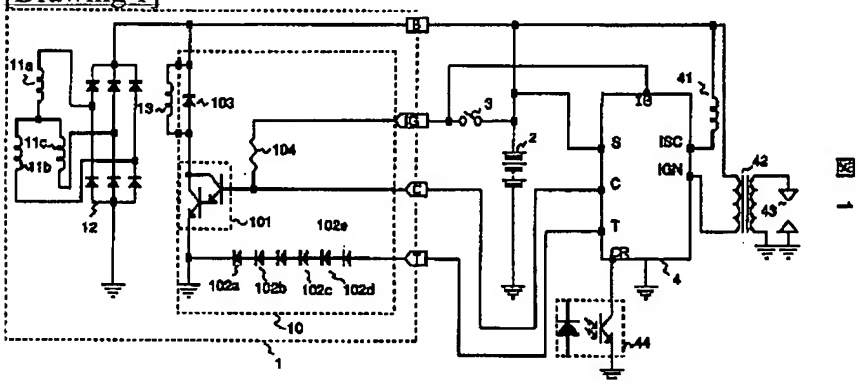
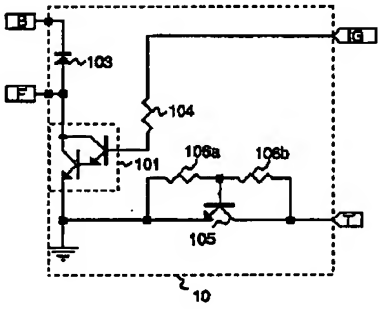


図 1

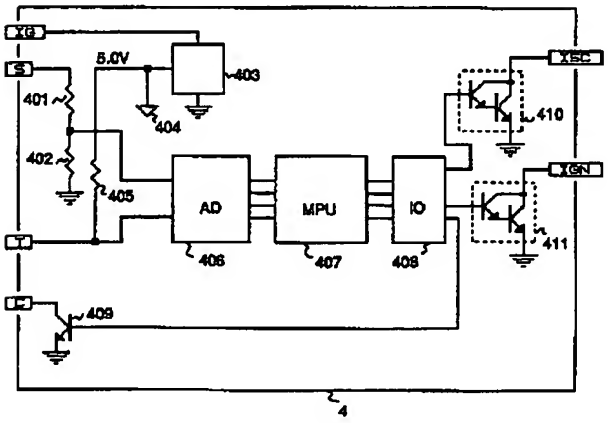
[Drawing 5]

図 5



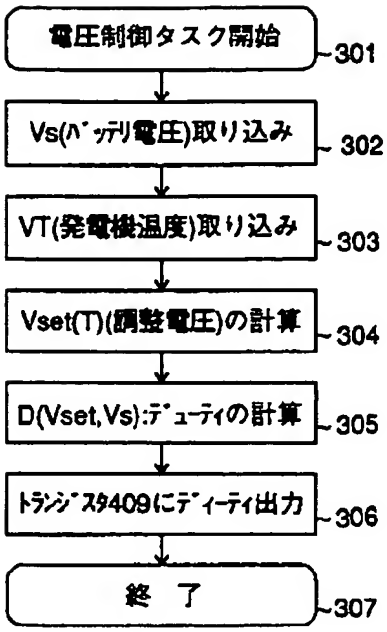
[Drawing 2]

図 2



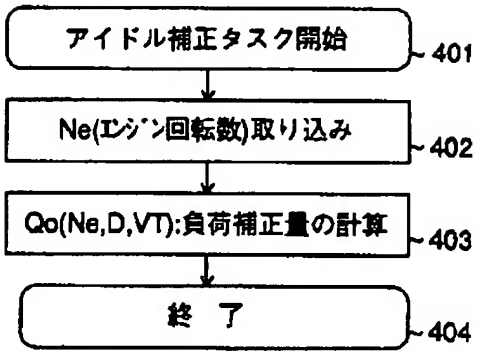
[Drawing 3]

図 3



[Drawing 4]

図 4



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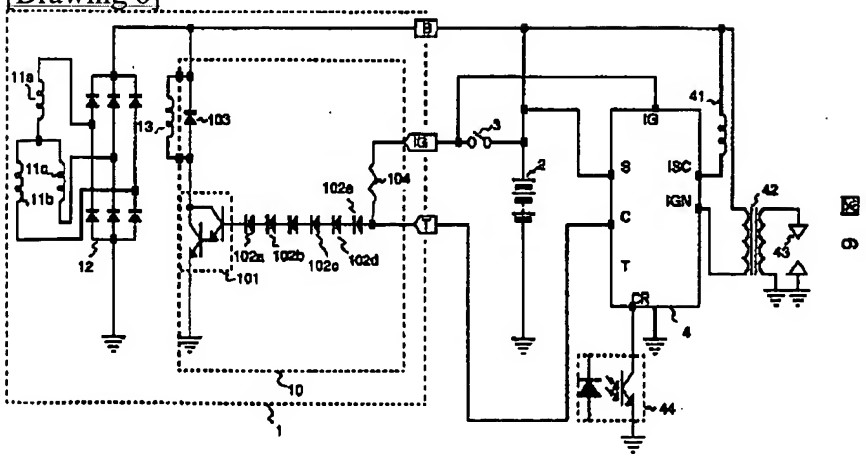
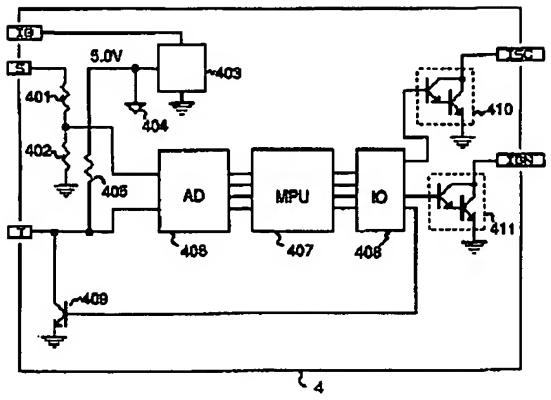


図 6

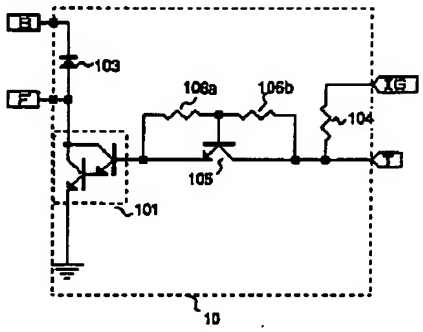
[Drawing 7]

図 7



[Drawing 8]

図 8



[Translation done.]